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action is not exhibited by a quantity of substance capable of some other different action, but is exhibited only when the quantity of the substance is a certain greatly increased amount, then the quality is not an essential quality, but one dependent on the quantitative relation.

In the application of these conclusions it is advantageous to recognize the different kinds of "added ingredients." Only those that serve some legitimate purpose in the food need be considered, as other additions would obviously be sophistication; moreover, it is convenient to classify such added substance according to the particular purpose that they serve. Thus, colors and preservatives are classes of added ingredients; they are not foods and yet may serve obvious purposes. In sufficient quantity any of these substances, like food itself, may be deleterious. Whether they are essentially injurious or whether such action is dependent on the quantitative relation is, from what precedes, to be determined according to whether they may be injurious in such quantities as are useful. If in these quantities they may be injurious or if such quantities are not widely separated from the amount that becomes injurious from the quantitative relation, then safety requires that they be considered as essentially deleterious and that they come under the designation of "added poisonous or other added deleterious ingredient." If the reverse is true, that is, if in the quantities added to food for a useful purpose the substances in question do not render such article of food injurious to health but are only capable of doing so when added in quantity widely separated from the amount made use of, then such possible deleterious action is not an essential quality of the substance, but a quality dependent on the quantitative relation, and the added ingredient is not an essentially deleterious substance and does not and may not render the article of food injurious to health according to the meaning and intent of the law. This is true whether or not the substance is capable of a deleterious action by its abuse in being used in the increased amount widely separated from the

quantity which subserves the purpose of its use. In this discussion, no new position is taken in regard to these matters; there is merely an attempt to present clearly distinctions which have long been established in practical life. As an example of such practice, consider the use of cream of tartar. As a result of its use rochelle salt becomes an added ingredient to the food. When ingested in relatively large quantity this substance acts as a saline purgative, abstracting fluid from the blood and in such quantity is, in health, a deleterious substance. However, such action is not exhibited in any degree by the very much smaller quantities present because of its use in food. Hence, rochelle salt because of its laxative effect in quantity is not an added poisonous or deleterious substance according to the meaning and intent of the law, notwithstanding that it may become deleterious by its abuse. Its addition to food is justified by its usefulness and by the fact that it is not essentially injurious, even though it may become injurious in the quantitative relation.

To summarize, we conclude that substances added to food are essentially injurious when incapable of serving a useful purpose in amount widely separated from the quantity that may produce deleterious effects; and that they are not essentially injurious when capable of serving a useful purpose in amount widely separated from the quantity that may produce deleterious effect, even though, in this latter instance, they may become deleterious by abuse of the quantitative relation.

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#### SPECIAL ARTICLES

##### A NEW FORM OF LIGHT FILTER FOR USE IN EXAMINING FLAME COLORATIONS

THIN transparent sheets of celluloid stained so as to give deep absorption spectra, like solutions of methyl violet and aniline blue, absorb the orange and yellow of the spectrum. The blue screen absorbs strongly from about 23 (in the spectrum scale having  $D$  at 50) to 60, that is, including the orange-red, the orange

and half the yellow. The violet screen absorbs strongly from about 33 to 70, that is, the orange and the yellow. The sodium line at 50 is therefore absorbed by both screens. Thus in the presence of sodium the red, green and blue colors imparted to the Bunsen flame by certain elements and compounds may be readily detected by means of the screens. Certain colors transmitted by one screen are absorbed by the screens together.

The strontium and the lithium flames appear deep red through the violet screen but give no color through the blue screen. Barium and boron give a vivid green through the blue screen, and only a faint green through the violet screen. Volatile calcium salts impart a strong greenish-yellow color to the flame as seen through the blue screen, but through the violet screen the color appears a pale red. Through the combined screens the flame has a tinge of green. The color flashes out only at the moment when the salt is becoming incandescent. Potassium gives through the blue screen an intense blue-violet color; through the violet screen the outside of Bunsen flame is violet and the inside violet-red; through both screens the flame appears as through the violet screen, but less bright, and with red predominating. These colors are very characteristic. The copper chloride flame appears bright blue fringed with green through the violet screen, brilliant green through the blue screen, and a paler green through both screens. The flame color of phosphoric acid is green through the blue screen, light rose color (violet-red) through the violet screen and pale green through both screens.

In getting these flame reactions from non-volatile compounds it is, of course, necessary to use some flux or acid that will produce a volatile compound of the element sought. A silicate containing potassium may be powdered, and decomposed in a sodium carbonate bead on a platinum wire. The resulting potassium carbonate is volatile. The phosphate minerals apatite, lazulite and wavellite give the phosphoric acid reaction readily if powdered, taken up on a moistened loop of platinum wire, heated and then treated with concentrated

sulphuric acid and again heated. The reaction is transient.

A screen  $3 \times 5$  inches consisting of three colored strips, one blue, one violet and one blue over violet, suitable for general laboratory use, has been made for the writer by Mr. G. M. Flint, Cambridge, Mass., price 20 cents.

Such a screen is conveniently handled and is so delicate a means of identifying the elements usually sought by means of the spectro-scope that its use greatly facilitates the work of laboratory instruction in qualitative analysis and mineralogy.

In case lithium light free from sodium light is wanted for use in optical mineralogy the violet screen is a very serviceable filter.

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#### THE SCOMBROID FISHES

IN a recent paper "On the Anatomy and Classification of the Scombroid Fishes"<sup>1</sup> C. Tate Regan proposes to remove the family Carangidæ (with other families of more or less possible scombroid affinities) from its time-honored position among the scombroid fishes, and place it among the percoids.

This comes somewhat as a shock to many ichthyologists, who, while having doubts as to many of the so-called scombroids, have believed the family Carangidæ to be unquestionably a scombroid family. Mr. Regan writes of the family Carangidæ as follows:

The more generalized members of this family (*Seriola*, *Naucrates*) have the anatomical characters of the Serranidæ, there being nothing in the structure of the cranium, vertebral column or pectoral arch to differentiate them from the latter, whilst genera like *Scombrops* and *Pomatomus* (*Temnodon*) connect the two families. In the Carangidæ the caudal peduncle is more slender, the caudal fin more widely forked, and the hypural embraced to a greater extent by the bases of the caudal finrays than in the Serranidæ, but the close relationship of the two families is evident.

<sup>1</sup> *Ann. and Mag. Nat. Hist.*, Ser. 8, Vol. III., January, 1909.